Studies on Cynipidae Alloxystinae

2. The identity of some species associated with aphids of economic importance

by

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Introduction

In an earlier paper the difficulties encountered in the identification of Cynipidae Alloxystinae were discussed (EVENHUIS, 1971). As I pointed out, the numerous species of the genus *Alloxysta* Förster sensu HELLEN are very similar and in many instances difficult to distinguish from one another.

In previous taxonomic literature colour characters were used predominantly, in order to differentiate the species in this group. By rearing many species from aphid mummies, from which the aphid and the primary Aphidiid parasite are known, I concluded that these characters are, to a large degree, specifically constant. Some authors have mentioned that colour characters may vary to a considerable extent. In these cases, however, the specimens were caught in the field and in my opinion more than one species might have been mixed. It must be remembered, however, that in some species there is a considerable difference in the colour pattern between male and female.

An important intraspecific variation in the tints in several species may occur, there being darker specimens and lighter-coloured ones with several kinds of intermediates. However, the distribution of the colours seems to me to be always the same. I have never, for example, reared specimens within one species with a dark head and others, of the same sex, with a light head, the colours of the other body parts being the same.

The estimation of the colours in dried specimens is not always simple. Different kinds of illumination may give different effects. Thus a black colour may seem dark brown when the insect is studied in a different position. Translucent light may cause dark effects in light-coloured heads. It also seems that the colours tend to become lighter in specimens that have been preserved for a long period. This has been observed especially in the HARTIG material, which has been preserved for more than a century.

The claws are always more or less dark in the specimens I have seen. The apex of the last tarsal segment is also dark to a varying extent and there seems to be some intraspecific variation in this respect. In the next, and subsequent descriptions, the colour of the last tarsal segment will not be mentioned unless there is a particular reason to do so.

Alloxysta victrix (Westwood)

Allotria victrix Westwood

WESTWOOD, J. O., 1833, *Mag. Nat. Hist., J. Zool., Bot., Mineral., Geol., Meteor.* 6: 494, 495, ♂ ♀.

Xystus erythrocephalus Hartig

HARTIG, T., 1840, *Z. Ent. Germar* 2: 199, ♂ ♀.

This species is the first described representative of the Cynipidae Alloxystinae. The short description by WESTWOOD, in combination with the fact that the species was reared from mummies of the rose aphid, *Aphis rosae* (*Macrosiphum rosae* (L.)), is sufficient to establish its identity. I have reared many specimens from mummies of *Macrosiphum rosae*, through the primary parasite *Aphidius rosae* Haliday, on cultivated roses from several localities in The Netherlands. The species was also reared from mummies of *Macrosiphum rosae*, through *Aphidius rosae*, on the secundary host plant *Dipsacus sylvestris* Huds.

In taxonomic literature, *Xystus erythrocephalus* Hartig is generally synonymized with *Allotria victrix* Westwood. In the HARTIG material of the "Zoologische Sammlung des Bayerischen Staates" in Munich (West Germany) there are 47 specimens indicated as belonging to *Xystus erythrocephalus*. Originally there must have been 50 specimens, but three of them have obviously been lost from the pins. WELD (1952) mentions that when he visited the museum in Munich in 1931, there were 40 types from which he took two with him for the U.S. Museum in Washington.

Whilst studying the 47 specimens indicated as *Xystus erythrocephalus*, I came to the conclusion that they belong to several species, which only show a superficial resemblance, especially in the colour pattern. There are some pins which contain several specimens, glued onto small triangular pieces of paper, belonging to at least three species. From this I can only conclude that HARTIG made mistakes in the identification and that the confusion was not caused by a later investigator, who might have misplaced the pins. I have had the same experience with a number of other species of HARTIG.

Though this author mentions (HARTIG, 1840): "Lebt parasitisch in der Rosen-Blattlaus und ist die am häufigsten vorkommende Art", I suggest that many of his specimens were not reared but captured in the field. There are only two pins, each with one female specimen, which contain mummies of *Macrosiphum rosae*. These mummies, however, have obviously not been left by Alloxystine hyperparasites, but by primary Aphidiid parasites, most probably *Aphidius rosae*. However, I accept that HARTIG intended to indicate that these Alloxystine specimens were actually reared.

One of the specimens is accompanied by a roundish piece of a rose leaf with two mummies, only one of which has been left by a primary Aphidiid parasite, whilst the other does not exhibit an exit hole at all. The pin also contains a red label, on which is written "Weld 1931", and a white label with the number 1036. Though the funiculus of the right antenna is missing, I indicated this specimen as the lectotype of *Xystus erythrocephalus* Hartig 1840. The other specimen is accompanied by one mummie, left by an Aphidiid parasite. It lacks the funiculus of both antennae.

I found that 31 of the 47 specimens are *Xystus erythrocephalus*. Only one of these is a male, mounted on a separate pin, which also bears a red label "Weld 1931". None of the other specimens are accompanied by such a label.

Xystus erythrocephalus Hartig is no doubt the same species as *Allotria victrix* Westwood. So I confirmed the two names as synonyms, a fact that has already been generally accepted in taxonomic literature.

GIRAUD (1860) synonymized *Cynips ruficeps* Zetterstedt with the present species and this procedure was followed by subsequent authors. The short description by ZETTERSTEDT (1838), without mentioning a host, does not allow for this conclusion. Moreover, this author gives a number of colour differences between the male and the female which I failed to detect in the studied specimens of *Alloxysta victrix.*

DALLA TORRE and KIEFFER (1910) give *Charips macrocera* (Thomson) as a synonym of *Charips victrix* (Westwood). THOMSON (1877) deals with it as a separate species. HELLEN (1963) writes: "Die Type von *macrocera* Thoms. habe ich gesehen und halte sie für eine schwarzköpfige Form der Art *flavicornis*". In the original description, however, THOMSON mentions the colour of the head (in latin) "flavostramineus", which means straw yellow. So I propose that this name should be omitted as a synonym of *Alloxysta victrix* (Westwood).

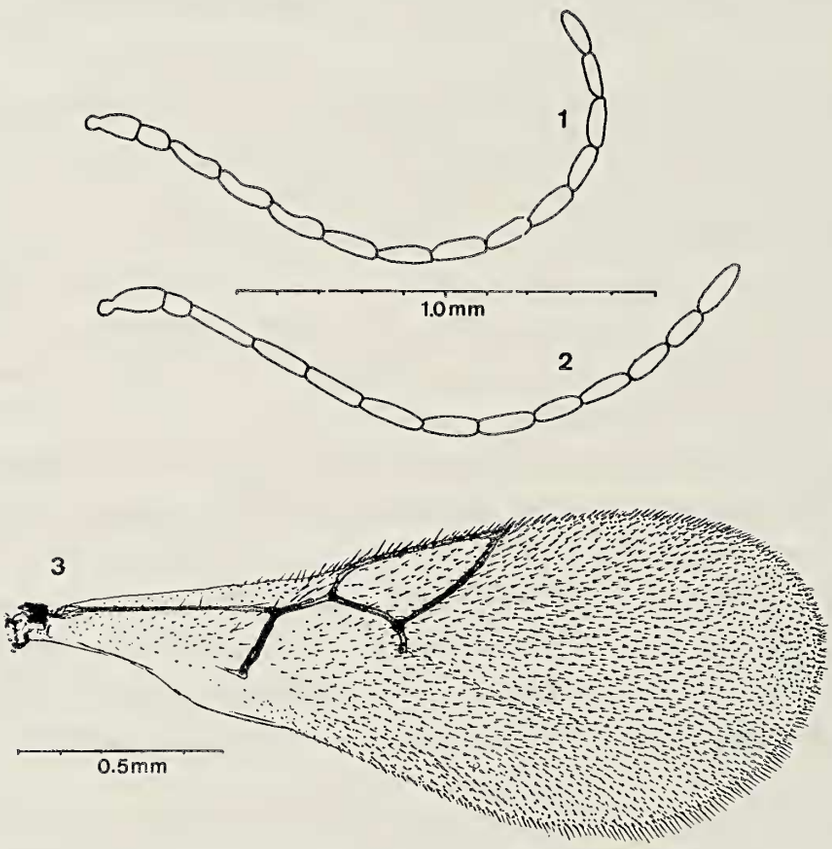

Fig. 1—3. *Alloxysta victrix* (Westwood). 1. Antenna (♂); 2. Antenna (♀); 3. Fore-wing (♂♀).

Morphological characters

Antennae see Fig. 1 (male) and Fig. 2 (female). In the male the antennal segment 3 is weakly curved and 4 and 5 are strongly curved. Fore-wing see Fig. 3. The propodeum does not show any sign of longitudinal keels and is uniformly pubescent.

Colour pattern

Male: Head yellow, above the insertion of the antennae more reddish yellow

and between the ocelli darker. Antennal segments 1 and 2 and the bases of 3, 4 and 5 yellow, the remainder dark brown. Thorax black. Legs yellow. Wings with dirty yellow veins. Abdomen black.

Female: As male, the first three antennal segments, however, entirely reddish yellow, the remainder dark brown.

Length of both male and female: 1.3—1.6 mm.

Alloxysta infuscata (Kieffer)

Allotria victrix var. *infuscata* Kieffer

KIEFFER, J. J., 1902, *Bull. Soc. Hist. nat. Metz*, 2 Sér., Tome 10, 22 cah., p. 16, ♂ ♀.

The cabbage aphid, *Brevicoryne brassicae* (L.), and its parasite *Diaeretiella rapae* (MacIntosh) have been the subject of many investigations in the field of ecology and applied entomology. Both species seem to be distributed all over the world where the food plant of the aphid, namely cabbage, has been introduced. With regard to the Alloxystinae hyperparasites, however, different species seem to be concerned in several publications. The names presented here have been found in literature: *Xystus* (= *Charips*) *brassicae* Ashmead (many authors, a.o. LOWE, 1959), *Charips longicornis* (Hartig) (BARNES, 1931; IONESCU, 1969), *Charips victrix* var. *infuscata* (Kieffer) (PETHERBRIDGE & MELLOR, 1936), *Charips minuta* (Hartig) (BILANOVSKII, 1938), *Charips ancylocerus* (Cameron) (a.o. HAFEZ, 1961; BROUSSAL, 1966), *Charips grioti* De Santis (ROJAS, 1966), *Charips arcuatus* (Kieffer) (IONESCU, 1969).

I have in my possession several Alloxystinae hyperparasites of *Brevicoryne brassicae* from several cabbage varieties, through the primary parasite *Diaeretiella rapae*, from a number of localities in the Netherlands. They all belong to the same species. Furthermore, I obtained quite a number of specimens from East Germany through the courtesy of Dr. D. PAETZOLD, Dresden, and reared from *Brevicoryne brassicae* through *Diaeretiella rapae*, on several varieties of cabbage. I also have a number of specimens from Mrs. J. M. DEKHUIJZEN-MAASLAND, Renkum, the Netherlands, who reared them from *Brevicoryne brassicae* on cabbage, through *Diaeretiella rapae* during her stay in Yonkers (N.Y., U.S.A.) in 1966. Both the East-German and the North-American specimens belong to the same species as the Dutch ones. I would suggest, therefore, that all Alloxystinae hyperparasites of *Brevicoryne brassicae* through the primary parasite *Diaeretiella rapae*, mentioned in literature from different parts of the world, belong in fact to the same species. The reason for so many names may be explained by the fact that the insects were identified, in most cases, with the work of DALLA TORRE and KIEFFER (1910), which cannot be relied upon, as stated earlier (EVENHUIS, 1971).

The species name *brassicae* was probably only used because *Allotria brassicae* was described by ASHMEAD (1887) for the species he reared from *Aphis* (= *Brevicoryne*) *brassicae* in Florida, U.S.A. The description does not fit the Dutch species. The presence of parapsidal grooves and a groove in front of the scutellum indicate that the ASHMEAD's species belongs to the genus *Phaenoglyphis*, which genus had already been described by FÖRSTER in 1869. It is a little surprising that ASHMEAD either did not know of the publication of FÖRSTER, or that he did not

notice the fact that species with parapsidal grooves had not previously been described in the genus *Allotria* Westwood. The taxonomical status of *Allotria brassicae* Ashmead seems enigmatical.

The only description that fits exactly is that of *Allotria victrix* Westwood var. *infuscata* Kieffer 1902. KIEFFER (1902) mentions "obtenu par M. Carpentier d'un Aphide vivant sur Sinapis alba. Amiens". *Sinapis alba* belongs to the food plants of *Brevicoryne brassicae*. So I think it may be taken for granted that our *Alloxysta* species is the same as *Allotria victrix* var. *infuscata*. DALLA TORRE and KIEFFER changed the rank of this "variety" to "subspecies" in their work of 1910. I do not attach much importance to these conceptions of "variety" and "subspecies", as discussed in my earlier paper (EVENHUIS, 1971). KIEFFER's taxon must be considered as a distinct species with a host selection that differs from that of *Allotria victrix*. It should be named *Alloxysta infuscata* (Kieffer).

As the head is almost entirely dark brown, it does not run in the keys of DALLA TORRE and KIEFFER (1910), to *Charips victrix*, under which species the four "subspecies" are dealt with. This may be the reason that only in the publication of PETHERBRIDGE & MELLOR (1936) the name "infuscata" is used.

The male of *Alloxysta infuscata* would run to *Charips ancylocerus* (Cameron). The description of *Allotria ancylocera* by CAMERON (1886), does not, however, fit in every respect; I cannot see that the coxae are darker than the rest of the legs and that the four anterior femora are lined with black above and below.

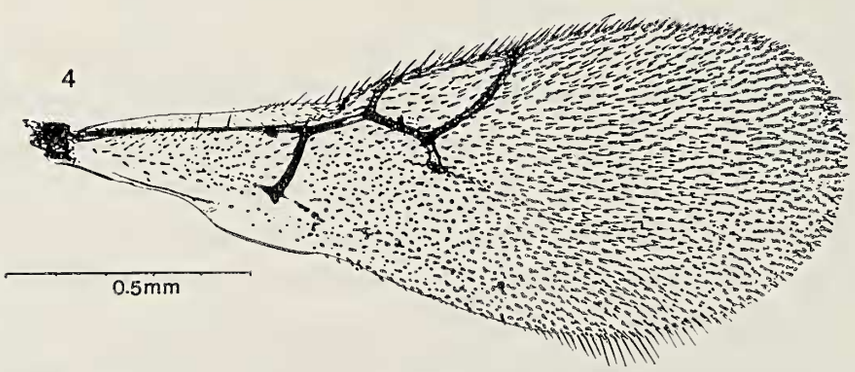

Fig. 4. *Alloxysta infuscata* (Kieffer), fore-wing (♂ ♀).

Morphological characters

This species has many characters in common with the preceding one. The antennal articles in both sexes are relatively a little shorter and thicker. Similarly, as in the male of *A. victrix*, the third antennal segment is slightly curved and the fourth and the fifth more strongly curved. The shape of the radial cellule in the fore-wing (Fig. 4) is the same as that of the *A. victrix*, the veins are relatively a little thicker. Longitudinal keels on the propodeum are also lacking; the propodeum is just as well pubescent.

Colour pattern

Male: Head dark brown or black, below the insertion of the antennae to the mouth gradually becoming lighter to a greater or lesser extent, mouth parts often yellow. Antennal segments 2 and 3 and the basis of 4 and sometimes 5 lighter; there may be some variation in the extension of the light colours. Thorax black,

tegulae dark brown. Legs light brown, knees and trochanters with adjacent parts of coxae and femora more yellowish, sometimes front tibiae uniformly yellowish; tarsi also yellowish. Wing veins brown. Abdomen black.

Female: As male, however antennal segments 2 and 3 light brown, 4 intermediate, the other segments darker.

Length of both male and female: 1.0—1.2 mm.

Alloxysta gautieri Kieffer

Alloxysta Gautieri Kieffer in GAUTIER.

GAUTIER, C., 1922, *Bull. Soc. ent. France*, Année 1921, published March, 1922, ♀.

This species was recorded by GAUTIER (1922) as a hyperparasite of an apple aphid which, judging from its description ("petit puceron à abdomen vert ou jaune vert des pommiers") can only be *Aphis pomi* De Geer. It was reared through the primary parasite *Trioxys placidus* Gautier 1922, which species was synonymized by MACKAUER (1959) with *Trioxys angelicae* (Haliday).

KIEFFER only described the female and this description, in combination with the host mentioned, is sufficient to establish its identity. In the course of my investigations on apple aphids I reared several hundred female specimens of *Alloxysta gautieri* from *Aphis pomi* on apple, through the primary parasite *Trioxys angelicae*. Only very few males were obtained; so this species might represent a case of deuterotoky (DOUTT, 1959). I also have specimens from *Aphis pomi* on cultivated *Cotoneaster* spec. in Oosterbeek (prov. of Gelderland) (leg. J. NOORLANDER) and from *Aphis craccivora* Koch on *Robinia pseudacacia* L. in Wageningen. It is no doubt a common species found all over the country.

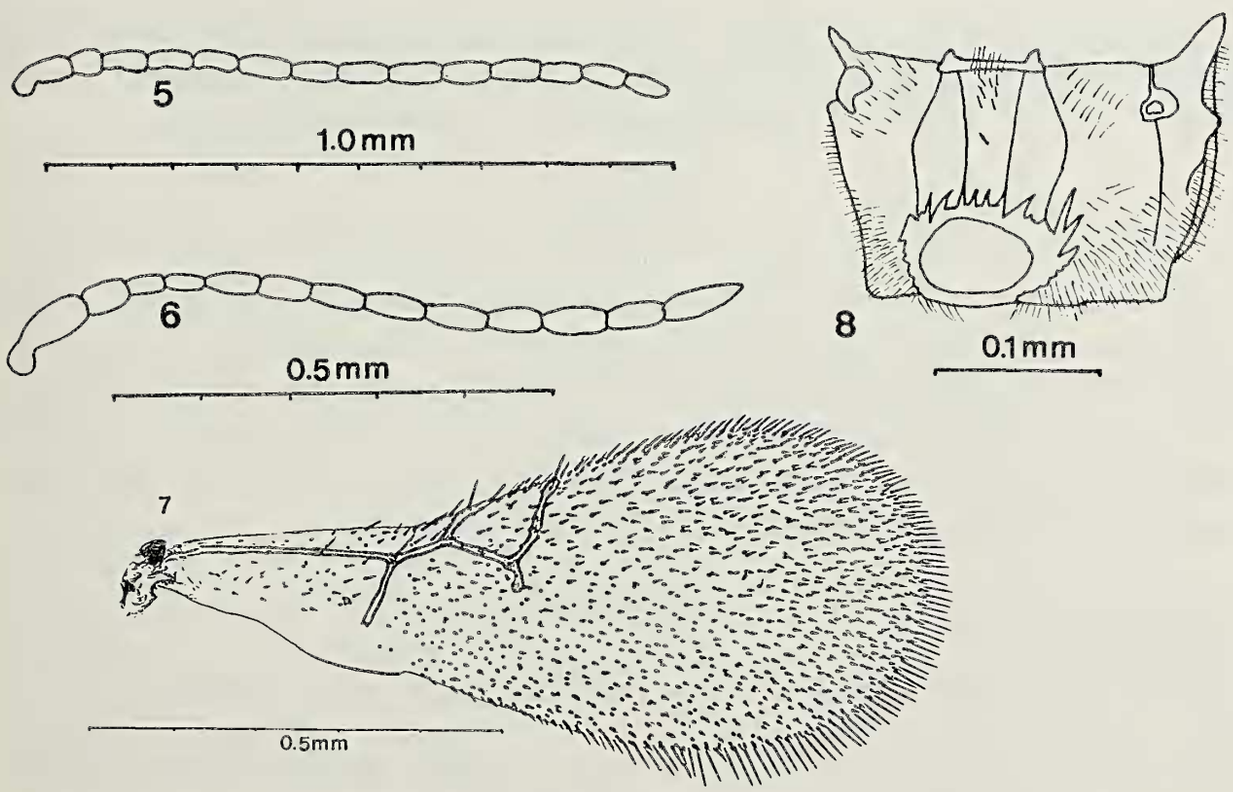

Fig. 5—8. *Alloxysta gautieri* Kieffer. 5. Antenna (♂); 6. Antenna (♀); 7. Fore-wing (♂ ♀); 8. Propodeum (♂ ♀).

In the HARTIG material there are several female specimens belonging to this species. However, none seem to belong to any of the species described by this author.

Morphological characters

Antennae in the male with segments 3, 4 and 5 very slightly curved (Fig. 5); antennae in the female relatively short and segments 3 and 4 conspicuously narrower and a little shorter than the remainder (Fig. 6). Fore-wing with radial cellule open at the front margin and conspicuously short (Fig. 7). Propodeum with four longitudinal keels (Fig. 8), a character that I did not find hitherto in any other species of the Alloxystinae.

Colour pattern

Male: In the lighter specimens head yellow, above the insertion of the antennae light brown. First five antennal segments yellow, remainder brownish. Thorax more or less reddish brown, dorsal part of prothorax, mesoscutum and scutellum darker. Fore-wing with light yellow veins. Legs yellow. Abdomen dark brown, more reddish at base. The darker specimens differ in that the head, above the insertion of the antennae, is dark brown, just like the whole thorax and the abdomen.

Female: Head yellow, vertex between the ocelli more reddish. First five antennal segments yellow, the remainder brownish. Dorsal part of prothorax, mesoscutum and whole scutellum dark brown, rest of thorax light brown. Wings, legs and abdomen as in the male.

Length of both male and female: 0.8—1.0 mm.

I am indebted to Mr. E. DILLER of the "Zoologische Sammlung des Bayerischen Staates" in Munich, West Germany, for the loan of HARTIG's material and to Prof. Dr. J. VAN DER VECHT, Putten, for critically reading the manuscript.

Summary

Three species of *Alloxysta* Förster sensu HELLEN have been discussed, namely *Alloxysta victrix* (Westwood), *Alloxysta infuscata* (Kieffer) and *Alloxysta gautieri* Kieffer. The aphid hosts and the primary Aphidiid parasites have been mentioned. A lectotype of *Xystus erythrocephalus* Hartig has been indicated; the name is a younger synonym of *Alloxysta victrix* (Westwood). It is concluded that colour characters can be used in distinguishing the *Alloxysta* species.

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PERSONALIA

Op 20 september j.l. promoveerde Drs. R. C. H. M. OUDEJANS tot Doctor in de Wiskunde en Natuurwetenschappen aan de Rijksuniversiteit te Utrecht. De titel van zijn proefschrift luidde: „De koolwaterstoffen van de miljoenpoot Graphidostreptus tumuliporus (Karsch)".

Promotor was Prof. Dr. D. I. ZANDEE.

De redactie wenst Dr. OUDEJANS van harte geluk met de succesvolle afsluiting van zijn universitaire studie.